



COMPLIANCE VERIFICATION

U. S. NAVY SUBMARINE SAFETY (SUBSAFE) PROGRAM

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September 14, 2004



Agenda

» History

- Origin of the SUBSAFE Program
- Program Review & Revitalization

» Compliance Verification Process



USS THRESHER

Video



On April 10, 1963, while engaged in a deep test dive, approximately 200 miles off the northeastern coast of the United States, the U.S.S. Thresher, (SSN-593), was lost at sea with all persons aboard - 112 naval personnel and 17 civilians.



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USS THRESHER INVESTIGATIONS

- » **Court of Inquiry**
- » **Design Appraisal Board**
- » **Congressional Committee Hearings**
- » **Focus**
 - Design
 - Construction
 - Operation

What Happened to USS THRESHER?

- » Flooding in the engine room
- » Unable to secure from flooding
- » Spray on electrical switchboards
- » Loss of propulsion power
- » Unable to blow ballast tanks

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USS THRESHER INVESTIGATIONS

- » **Deficient Specifications**
- » **Deficient Shipbuilding and Maintenance Practices**
- » **Incomplete or Non-Existent Records**
 - Work Accomplished
 - Critical Materials
 - Critical Processes
- » **Deficient Operational Procedures**



SUBSAFE Program Inception

- » **BUSHIPS letter ser 525-0462 of 20 December 1963**
SUBJ: Submarine Safety Certification Criterion
- » **Provided the basic foundation and structure of the program that is still in place today**
 - **Design Requirements**
 - **Initial SUBSAFE Certification Requirements and Process**
 - **Certification Continuity Requirements and Process**



Submarine Safety (SUBSAFE) Requirements

- » **Administrative**
- » **Organizational**
- » **Technical**
- » **Unique Design**
- » **Material Control**
- » **Fabrication**
- » **Testing**
- » **Maintenance Control**
- » **Audits**
- » **Certification**

Purpose of...

» **SUBSAFE Program:**

- Provides maximum reasonable assurance:
 - Of hull integrity to preclude flooding
 - That the submarine can recover from a flooding casualty

» **SUBSAFE Certification Process:**

- Ensures that the SUBSAFE program requirements have been met
- Provides a structured sequence for certifying a ship for unrestricted operations



SUBSAFE PROGRAM SUCCESS

1915 – 1963

» 16 U.S. Navy Submarines Lost to Non-Combat Causes

- USS F-4 (SS-23) 21 MAR 1915
- USS F-4 (SS-20) 17 DEC 1917
- USS H-1 (SS-28) 12 MAR 1920
- USS S-5 (SS-110) 01 SEP 1920
- USS O-5 (SS-66) 11 OCT 1923
- USS S-51 (SS-162) 25 SEP 1926
- USS S-4 (SS-109) 17 DEC 1927
- USS SQUALUS (SS-192) 23 MAY 1939
- USS O-9 (SS-70) 20 JUN 1941
- USS S-26 (SS-131) 24 JAN 1942
- USS R-19 (SS-96) 21 JUN 1942
- USS R-12 (SS-89) 12 JUN 1943
- USS S-28 (SS-133) 04 JUN 1944
- USS COCHINO (SS-345) 26 AUG 1949
- USS STICKLEBACK (SS-415) 30 MAY 1958
- USS THRESHER (SSN-593) 10 APR 1963*

Since 1963

» 1 Submarine Lost

- USS SCORPION (SSN 589) – 1968
 - Not SUBSAFE Certified
 - Loss would not have been prevented by SUBSAFE Program

MAINTAINING THIS RECORD OF SUCCESS IS A CONSTANT BATTLE!

Cost

Quality

VS

Schedule

Compliance

Complacency



REVIEW OF THE SUBSAFE PROGRAM 1984 - 1987

- » **NAVSEA Directed a Thorough Evaluation of the Entire SUBSAFE Program Shortly After Its 20th Anniversary**
- » **Challenger Accident Added Impetus**
- » **Included Review of SUBSAFE Program Requirements & Need for Revision**



REVIEW OF THE SUBSAFE PROGRAM 1984 - 1987

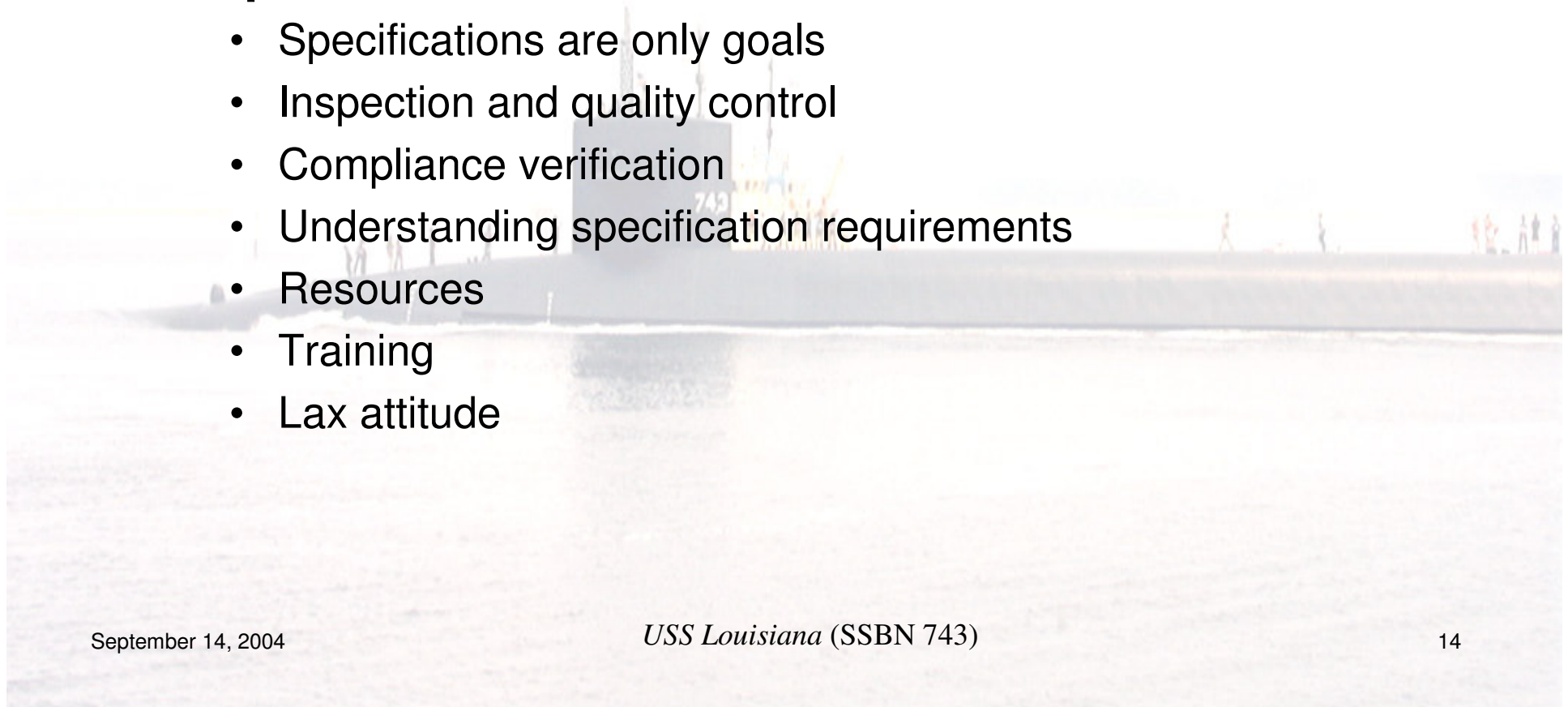
- » **NAVSEA Senior Review Group Chartered To Conduct Review**
- » **Results**
 - **General Lack of Awareness**
 - **Strong Evidence of Complacency In the Execution of the SUBSAFE Program**



REVIEW OF THE SUBSAFE PROGRAM 1984 - 1987

» Specific Problem Areas

- Specifications are only goals
- Inspection and quality control
- Compliance verification
- Understanding specification requirements
- Resources
- Training
- Lax attitude



ACTIONS

- » **Message – Compliance is Mandatory**
- » **Awareness Training Required**
- » **Requirements Reviewed & Clarified**
- » **Submarine Safety & Quality Assurance Office Created**
- » **Facility SUBSAFE Program Director Positions Created**
- » **Functional (Institutional) Audit Program Established**
- » **Certification (Programmatic) Audit Program Strengthened**



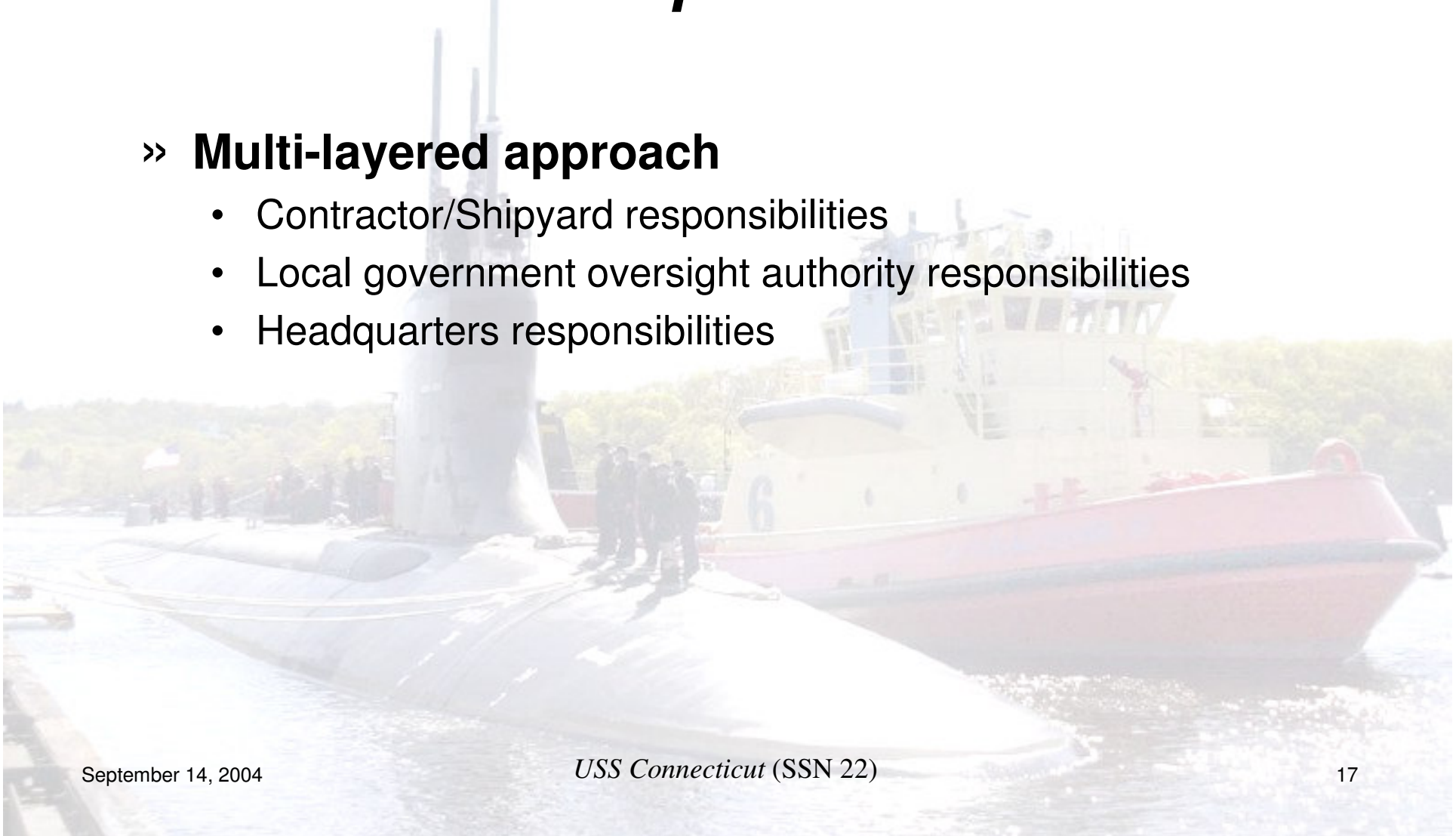
SUBSAFE

Compliance Verification

SUBSAFE Compliance Verification

» Multi-layered approach

- Contractor/Shipyard responsibilities
- Local government oversight authority responsibilities
- Headquarters responsibilities



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USS Connecticut (SSN 22)

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SUBSAFE Compliance Verification

» Contractor/Shipyard Responsibilities

- Implement Specified Requirements
- Establish Processes For Controlling Work
- Establish Processes To Verify Compliance and Certify Its Work
 - Quality management system
 - Surveillances
 - Inspections
 - Contractor QA witness critical work
 - Internal audits
- Certify work to local government oversight authority

SUBSAFE Compliance Verification

» Local government oversight authority responsibilities

- Surveillances
- Inspections
- QA witness critical contractor work
- Audits of the contractor
- Certify work of the contractor to Headquarters

SUBSAFE Compliance Verification

» Headquarters Responsibilities

- Establish and specify SUBSAFE requirements
- Verify Compliance
 - Functional (Institutional) Audits
 - Certification (Programmatic) Audits
- Provide final SUBSAFE certification for each submarine



SUBSAFE COMPLIANCE VERIFICATION AUDITS

» Functional (Institutional) Audits

- Policies
- Procedures
- Practices

» Certification (Programmatic) Audits

- Ship Specific Objective Quality Evidence

FUNCTIONAL (INSTITUTIONAL) AUDITS

- » **Review Policies, Procedures and Practices Used to Perform SUBSAFE Work**
 - **Compliance with SUBSAFE Requirements**
 - **Capability to Produce Certifiable or Certified Products**
 - **Material, Components, Submarines**



FUNCTIONAL (INSTITUTIONAL) AUDITS

- » **Audit Guide: Management, Training, QA Program, Material Control, In-Process Work, Work Control & Documentation, Technical/Engineering**
- » **Successful Functional Audit is Basis for Authorizing a Facility to Continue to Perform SUBSAFE Work**

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USS Virginia (SSN 774)

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CERTIFICATION (PROGRAMMATIC) AUDIT

- » **Review of the SUBSAFE Work Performed on a Specific Submarine Undergoing New Construction or Major Overhaul**
- » **Reviews Objective Quality Evidence to Verify Authorized SUBSAFE Work Was Performed, Completed and Tested in Accordance with Requirements**



CERTIFICATION (PROGRAMMATIC) AUDIT

- » **Formal Audit Plan – Each Element of the Plan Must be Audited, e.g., Technical Direction, Structural Work (Welding, NDT), Valve Repair, Testing, Inspections, Documentation**
- » **The Audit Results and Satisfactory Resolution of any Findings Become One of the Bases for Final Certification by NAVSEA**

AUDIT PHILOSOPHY

- » **We Focus on Audits as a Constructive Experience**
- » **The Objective is Make Our Submarines Safer**
- » **We Assume Processes and Procedures are in Compliance**
 - **The Audit Confirms Compliance**



AUDIT PHILOSOPHY

- » **The Most Effective Audit is a Team Effort**
 - **Audit Team & Facility Personnel**
 - **Continuous Communication is Key to Success**
 - **And to Full Understanding of Identified Problems**

- » **Audit is a Peer Review – 80% of Auditors Come From Other SUBSAFE Facilities and Live and Work in the SUBSAFE Program Every Day**



SUBSAFE Certification

Certify

- » To confirm formally as true, accurate, or genuine
- » To guarantee as meeting a standard
- » To assure or make certain



The SUBSAFE Compliance Verification Process is the Basis for SUBSAFE Certification

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Objective Quality Evidence (OQE)

- » **OQE is a statement of fact, either quantitative or qualitative, pertaining to the quality of a product or service based on observations, measurements, or tests that can be verified.**